

like a street lamp in a November fog. A *Times* correspondent at Cheltenham says that the path of the body was almost due east and west, and the apparent time of flight about 20". The meteor was also observed at Southampton, Tunbridge Wells, and Beckenham.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

The Sedgwick Memorial Committee (Cambridge) have passed the following resolution, which has been sent to the Vice-Chancellor:—"That a communication be made on behalf of the Committee to the University to the effect that a sum of about 12,000*l.* is now at their disposal for a memorial to the late Prof. Sedgwick, and that the Committee are prepared to apply this money towards the erection of a new geological museum when a plan satisfactory to the Committee has been approved by the Senate."

On the nomination of Prof. Miller, Mr. W. J. Lewis, M.A., Fellow of Oriel College, Oxford, has been approved as Deputy Professor of Mineralogy for twelve months, from October 1, 1878, Prof. Miller assigning to Mr. Lewis two-thirds of his stipend.

Mr. J. A. Ewing, B.Sc., F.R.S.E., has been appointed Professor of Mechanical Engineering in the University of Tokio, Japan.

SCIENTIFIC SERIALS

Bulletin de l'Académie Royal de Belgique, No. 1, 1878.—In researches on Daltonism, here described, MM. Delbœuf and Spring used a solution of fuchsine between two convergent plates of glass (the red is wanting in M. Delbœuf's sight). Thus a suitable thickness of red could be readily selected, and it was found that colours previously confounded showed notable differences. A solution of chloride of nickel interposed between objects and the eye produces in non-Daltonians the same confusion as that of Daltonians. Fuchsine opposes and destroys the effect of chloride of nickel: so that the non-Daltonian in whom the latter produces confusions ceases to have these when he looks also through the fuchsine. Daltonism is regarded as merely an exceptional exaggeration of a peculiarity found in all eyes to a certain degree.—M. Terby furnishes fifteen figures of Mars as observed during the opposition of 1877.—The physiological action of *Gelsemium*, on respiration, circulation, and temperature, is described by MM. Putzey and Romée.—M. de Koninck announced that his son found, in the Ardennes, the very rare mineral carpholite, hitherto only met with in the Harz and Bohemia.

No. 2.—From experiments with regard to the fertilising action of the grey chalk of Ciply, in Belgium (which contains 11.50 per cent. of phosphoric acid), M. Petermann concludes that bicalcic phosphate, called precipitated phosphate, and the phosphates of iron and alumina, have the same agricultural value as the phosphoric acid of soluble phosphates, that is, their phosphoric acid may be immediately assimilated by plants. He therefore advises the disuse of the Cipley Chalk, and he considers it can only be utilised in agriculture after its transformation into precipitated phosphate. (M. Stas thinks this conclusion too absolute).—M. Quetelet reviews observations of the movements of the magnetic needle at Brussels from 1828-76. The magnetic line diverges very little from a central axis, with which it makes an angle of about 5°. It turns round this axis in a direction opposite to that of the earth's diurnal motion; the angle described annually is about 42'2", and the complete revolution would appear to be effected in 512 years. The secondary movements and accidental displacements do not sensibly affect the principal secular movement.—M. Donny recalls experiments he made, in 1843, with Prof. Mareska, on liquefaction of gases. They often compressed air (with a hydraulic pump) in the capillary part of a manometer to more than 500 atm., and M. Donny thinks they may have liquefied the gas without knowing it.—MM. Navez describe a combination of an induction coil with the telephone for speaking at great distances. The induced currents are sent into the line, while the sending instrument is inserted in the local circuit connected with the battery. The receiving telephone is somewhat modified.—The subjects for prizes offered by the Academy for 1879 are announced in this number.

Reale Istituto Lombardo di Scienze & Lettere. Rendiconti, vol. xi. fasc. iv.-vi.—We note the following papers in these numbers:—Deformative hypertrophy of the nails, by M. Sangalli.—Claustrophobia, by M. Verga.—Some experiments with the telephone, by M. Serpieri.—On the dominant diseases of the vine, by MM. Garovaglio and Cattaneo.—On the kinematics of a solid body, by M. Bardelli.—Lecture experiment (illustrating liquefaction of gases), by M. Brugnattelli.—An experiment on electrostatic induction, by M. Cantoni.—On a case of heterogenesis observed in nature, by MM. Battista and Corrado.—Reduction of argentic and ferric chloride, by M. Tommasi.—Geological observations on the Carso di Trieste and the valley of the Recci with reference to water supply, by M. Taromelli.

THE *Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg* (t. xxiv. No. 4) contains the following papers of interest:—Development into converging series of the odd negative powers of the square roots of the function $1 - 2\eta U + \eta^2$, by Dr. J. Backlund.—Variation of the volume of liquids through the effect of temperature, by M. Avenarius.—On some new forms of crystals of ilmeno-rutile, by P. Jeremejew.—On the development of excrescences (cephalodia) on the thallus of *Lichen, Peltigera aphthosa*, Hoffm., by M. Babikoff.—On a new case of divisibility of the numbers of the form $2^{2^m} + 1$, found by the Rev. J. Pervouchine, by V. Bouniakowsky.—A note on the opposition of planets during 1877, by A. Sawitch.—On an extremely slight earthquake observed by means of a very delicate level on May 10, 1877, by M. Nyrén.

Morphologisches Jahrbuch, vol. iv., supplement, dedicated to Carl von Siebold.—On the cranial skeleton of alepocephalus, a clupeoid fish, by Prof. Gegenbaur, two plates, 42 pp.—Fossil vertebrae, by C. Hasse, dealing with the relationship of the genus *Selache*; two plates. The author believes this genus to have developed from *Carcharodon* in the tertiary period.—The gorilla's brain and the third frontal convolution, by Prof. von Bischoff, a controversial article referring to Prof. Broca's researches and views.—Contribution on the coral family *Antipatharia*, by G. von Koch.—The disposition and development of elastic tissue, by L. Gerlach, with two beautiful plates.—The development of the muscular structure of the human foot, by G. Ruge, 36 pp. one plate.

THE *Notizblatt des Vereins für Erdkunde zu Darmstadt* (iii. xvi. Nos. 181 to 192) contains some interesting statistical data from the Hessian Central Statistical Office. The papers of geological interest are: On the crystalline lime of Auerbach on the Bergstrasse, by R. Ludwig.—On the minerals found in the cavities of the melaphyr from Traisa and in the basalt of the Rossberg, by the same.—On the minerals and fossils found near Hering (Hessen), by the same.—Comparative account of the products of all Hessian mines during the years from 1860 to 1876, by Herr Tecklenburg.—On the fauna of the real *Cyrene emery* of Sulzheim, near Woerrstadt (Hessen), by Dr. O. Boettger.

SOCIETIES AND ACADEMIES LONDON

Royal Society, May 2.—"Preliminary Notes on Experiments in Electro-Photometry." By Prof. James Dewar, F.R.S., Jacksonian Professor, University of Cambridge.

Edmond Becquerel, in the year 1839, opened up a new field of chemical research through the discovery that electric currents may be developed during the production of chemical interactions excited by solar agency.

Hunt, in the year 1840, repeated, with many modifications, Becquerel's experiments, and confirmed his results.

Grove, in 1858, examined the influence of light on the polarized electrode, and concluded that the effect of light was simply an augmentation of the chemical action taking place at the surface of the electrode.

Becquerel, in his well-known work, "*La Lumière*," published in 1868, gives details regarding the construction of an electrochemical actinometer formed by coating plates of silver with a thin film of the sub-chloride, and subsequent heating for many hours to a temperature of 150° C.

Egeroff, in 1877, suggested the use of a double apparatus of Becquerel's form, acting as a differential combination, the plates of silver being coated with iodide instead of chloride.

The modifications of the halogen salts of silver when subjected to the action of light have up to the present time been used most

successfully in the production of electric currents, and although mixtures of photographically sensitive salts have been shown by Snee to produce currents of a similar kind, yet no attempt has been made to examine the proper form of instrument required for the general investigation of electrical actions induced by light on fluid substances.

This subject has occupied my attention for some time, and the completed investigation I hope to present to the Society. In the meantime the following description will give an idea of the method of investigation.

A little consideration shows that the amount of current produced by a definite intensity and quality of light acting during a short period of time on a given sensitive substance in solution, is primarily a function of the nature, form, and position of the poles in the cell relatively to the direction in which the light enters, and the selective absorption, concentration, and conductivity of the fluid.

Diffusive action taking place in such cells complicates the effects and is especially intricate when insoluble substances are formed. In order to simplify the investigation in the first instance, poles that are not chemically acted upon, and a sensitive substance yielding only soluble products on the action of light, were employed. For this purpose platinum and chlorous acid or peroxide of chlorine were selected.

The best form of cell had one of the poles made of fine platinum wire fixed as closely as possible to the inner surface where the light enters, the other pole being made of thicker wire placed deeper in the fluid.

As the action is confined to a very fine film where the light enters, the maximum amount of current is obtained when the composition of the fluid is modified deep enough to isolate temporarily the front pole in the modified medium. Under these conditions the formation of local currents is avoided, and the maximum electromotive force obtained.

In cells of this construction the amount of current is independent of the surface of the fluid acted upon by light, so that a mere slit sufficient to expose the front pole acts as efficiently as a larger surface. This prevents the unnecessary exhaustion of material, and enables the cell to be made of very small dimensions. By means of such an apparatus the chemical actions of light and their electrical relations may be traced in many new directions.

The amount and direction of the current in the case of chlorous acid is readily modified by the addition of certain salts and acids, and thus electrical variation may be produced, resembling the effects observed during the action of light on the eye.

Certain modifications taking place in chlorous acid that has been prepared for some time increase its sensibility, and as a general result it is found that the fluid through these alterations increases in resistance. We have thus an anomalous kind of battery where the available electromotive force increases with the resistance. The addition of neutral substances which increase the resistance without producing new decompositions, improves the action of the cell.

Care has to be taken to use the same apparatus in a series of comparative experiments, as infinitesimal differences in the contact of the active pole render it difficult to make two instruments giving exactly the same results. Cells have been constructed with two, three, and four poles, and their individual and combined action examined. Quartz surfaces have also been employed instead of glass, thus enabling the chemical opacity of different substances to be determined.

The electrical currents derived through the action of light on definite salts are strong in the case of ferro- and ferri-cyanide of potassium, but remarkably so in the case of nitroprusside of sodium.

Of organic acids the tartrate of uranium is one of the most active. A mixture of selenious acid and sulphurous acid in presence of hydrochloric acid yields strong currents when subjected to light in the form of cell described. The list of substances that may be proved to undergo chemical decomposition is very extensive, and full details will be found in the completed paper.

Geological Society, May 8.—Henry Clifton Sorby, F.R.S., president, in the chair.—Charles Preller Sheibner, Ph.D., was elected a Fellow of the Society.—The following communications were read:—On the glacial phenomena of the Long Island, or Outer Hebrides (second paper), by James Geikie, F.R.S. In this paper the author gave some additional notes on the glacia-

tion of Lewis, and a detailed account of the glacial phenomena of Harris and the other islands that form the southern portion of the Outer Hebrides. In concluding, the author pointed out that we may now arrive at a true estimate of the thickness attained by the ice-sheet in the north-west of Scotland. If a line be drawn from the upper limits of the glaciations in Ross-shire (3,000 feet) to a height of 1,600 feet in the Long Island, we have an incline of only 1 in 210 for the upper surface of the ice-sheet; and of course we are able to say what thickness the ice reached in the Minch. Between the mainland and the Outer Hebrides it was as much as 3,800 feet. No boulders derived from Skye or the mainland occur in the Till of the Outer Hebrides, and this was explained by the deflection of the lower portion of the ice-sheet against the steep wall of rock that faces the Minch. The under part of the ice that flowed across the Minch would be deflected to right and left against the inner margin of the Long Island; and the deep rock-basins that exist all along that margin are believed to have been scooped out by the grinding action of the deflected ice. Towards the north of Lewis, where the land shelves off gently into the sea, the under strata of the ice-sheet were enabled to creep up and over the district of Ness, and thus gave rise to the lower shelly boulder-clay of that neighbourhood, which contains boulders derived from the mainland. The presence of the overlying interglacial shell-beds proves a subsequent melting of the ice-sheet, and a depression of the land for at least 200 feet. The overlying shelly boulder-clay shows that the ice-sheet returned and overflowed Lewis, scooping out the older drift-beds and commingling them with its bottom moraine. The absence of kames was commented upon, and shown to be inexplicable on the assumption that such deposits are of marine origin; whilst if they be of torrential origin their absence is only what might be expected from the physical features of the islands. The only traces of post-glacial submergence are met with at merely a few feet above present high-water mark.—Cataclysmic theories of geological climate, by James Croll, F.R.S. Communicated by Prof. Ramsay, F.R.S. The author commenced by calling attention to the great diversity of the hypotheses which have been brought forward for the explanation of those changes in the climate of the same regions of the earth's surface which are revealed by geological investigations, such as alterations of the relative distribution of sea and land, of the ecliptic, and of the position of the earth's axis of rotation, all of which, he maintained, have proved insufficient or untenable. Sir William Thomson has lately maintained that an increase in the amount of heat conveyed by ocean-currents combined with the effects of clouds, winds, and aqueous vapour, is sufficient to account for the former prevalence of temperate climates in the Arctic regions, and this view, the author stated, he had himself been contending for more than twelve years. He thinks, however, that alterations in the eccentricity of the earth's orbit is the primary motive cause, whilst Sir William Thomson believes this to be the submergence of circumpolar lands, which, however, in miocene times, appear to have been more extensive than at present. He pointed out that a preponderance of equatorial land, as assumed by Sir Charles Lyell to account for the milder climate of Arctic regions in miocene times, would rather tend to loss of heat by rapid radiation into space, whilst water is remarkably powerful as a transporter of heat, so that, in this case, equatorial water rather than equatorial land is needed. In speaking of the glacial climate, the author maintained that local causes are insufficient to explain so extensive a phenomenon. He indicated that we are only too prone to seek for great or cataclysmic causes, and although this tendency has disappeared from many fields of geological research, this is not the case in all. His explanation of the causes of a mild climate in high northern latitudes is as follows:—Great eccentricity of the earth's orbit, winter in perihelion, the blowing of the south-east trades across the equator perhaps as far as the tropic of Cancer, and impulsion of all the great equatorial currents into northern latitudes; on the other hand, when, with great eccentricity, the winter is in aphelion, the whole condition of things is reversed; the north-east trades blow over into the southern hemisphere, carrying with them the great equatorial currents, and glacial conditions prevail in the northern hemisphere. Thus those warm and cold periods which have prevailed during past geological ages are regarded by the author as great secular summers and winters.—On the distribution of ice during the glacial period, by T. F. Jamieson, F.G.S. The author believes that a study of the distribution of ice during the glacial period proves that the greatest

accumulation of snow took place in precisely those districts which are now characterised by a very heavy rainfall, and he pointed out how exactly this is in accordance with the views of Prof. Tyndall as to the conditions most favourable to the development of glaciers.

Zoological Society, May 21.—F. D. Godman, F.Z.S., in the chair.—A communication was read from Lieut.-Col. R. H. Beddome, C.M.Z.S., containing the description of a new genus and species of snakes, of the family of Calamariidae, from Southern India, proposed to be called *Xylophis indicus*.—Mr. P. L. Sclater, F.R.S., read the tenth of a series of reports on the collection of birds made during the voyage of H.M.S. *Challenger*, containing an account of the birds of the Atlantic Islands and Kerguelen's Land, and of the miscellaneous collections made by the expedition.—Mr. J. Wood Mason, F.Z.S., described several new or little known Mantidae from India, Australia, and other localities.—Mr. H. W. Bates, F.Z.S., read a paper containing the description of new genera and species of Geodephagous Coleoptera from Central America, belonging to the families Cicindelidae and Carabidae.—Mr. G. French Angas, C.M.Z.S., read the description of a new species of *Tudicula*, which he proposed to name *T. inermis*.—A communication was read from the Marquis of Tweeddale, F.R.S., being the ninth of his contributions to the ornithology of the Philippines. The present paper gave an account of the collection made by Mr. A. H. Everett in the Island of Palawan, and contained the descriptions of nine new species, namely, *Tiga everetti*, *Dicrurus palawanensis*, *Broderipus palawanensis*, *Trichostoma rufifrons*, *Dryocotaphus cinereiceps*, *Brachypus cinereifrons*, *Criniger palawanensis*, *Cyrtostomus aurora*, and *Corvus pusillus*. The collection likewise contained three examples of the remarkable *Polyplectron emphanes*, of which the locality was previously unknown, and specimens were excessively rare.—Prof. A. H. Garrod, F.R.S., read a paper in which he gave a description of the tracheæ of *Tantulus loculator* and of *Vanellus cayennensis*.—A second paper by Mr. Garrod contained some notes on the anatomy of the Great-headed Maleo (*Megacephalon maleo*).

Victoria (Philosophical) Institute, May 31.—Annual Meeting; the president, the Right Hon. the Earl of Shaftesbury, K.G., in the chair.—From the annual report it appeared that the number of members is now 756.—The Address was delivered by Principal Rigg, D.D., and contained a review of various systems of philosophy now popular.

PARIS

Academy of Sciences, June 3.—M. Fizeau in the chair.—The following among other papers were read:—Direct determination at sea of the azimuth and route of a ship, by M. Paye. This is for iron ships, and involves keeping the ship some time in a fixed direction indicated by the log-line and determined astronomically. The log is slightly modified in form.—New researches on the fossil mammalia of South America, by M. Cernais. The author has examined the recent collections of MM. Ameghino, Brachet, and Larroque, from the province of Mines, in Brazil, and some parts of the Argentine Republic. He is able to add some new details about the Toxodon, and describe, *inter alia*, a new species of Machairodus, and two new species of Glyptodon (the species of which, he estimates, certainly exceed a dozen).—On the chalk of the Central Pyrenees, by M. Leymerie. He finds there a bed immediately under the first eocene layer, containing quite a special marine fauna, among which are numerous urchins.—M. Cornu was elected member in the section of physics in place of the late M. Becquerel.—Direct fixation of carbonic acid, sulphurous acid, and phthalic anhydride, on benzene; synthesis of benzoic acid, hydride of sulphophenyl, and benzoylbenzoic acid, by MM. Friedel and Crafts. The authors suppose in these syntheses an organo-metallic combination of aluminium by the reaction of the chloride of this metal on the hydrocarbons.—On the manufacture of cast manganese and on the volatility of manganese, by M. Jordan. More than 100,000 kil. of this cast manganese (from treating ores of manganese in the blast furnace) have already been supplied to French steel works. Manganese is volatile at the temperature of metallurgical furnace; and this fact explains several anomalies remarked in the manufacture of very manganeseised products.—On Daltonism; sanitary precautions, and preventives, by M. Favre. There are in France more than 3,000,000 persons affected with Daltonism; the number of women affected is to

that of men as 1 : 10. Nine out of ten cases can easily be cured in youth; the best means being methodic exercise on coloured objects. This should be attended to in all schools, and mothers should seek to develop the chromatic sense in their children. No one should be admitted to the service of railways, the navy, or schools of painting, without being examined in colours. No Daltonians should be charged with service involving the use of coloured signals.—Information was given regarding observation of the transit of Mercury in the United States.—On the densities of vapour, by M. Troost. He describes the behaviour of vapour of acetic acid, hyponitric acid, sulphur, and hydrate of chloral. Sulphur vapour behaves like ozone, whose density is independent of pressure, and whose transformation into oxygen takes place in proportion as the temperature is raised.—On metallic allotropy, by M. Schutzenberger. By electrolysis of metallic solutions, allotropic varieties of other metals besides copper (*e.g.* lead) may be got. It is impossible to decide by direct experiment whether or not allotropic copper contains occluded hydrogen eliminable at 100°. In any case the proportion of hydrogen could not exceed 0.03 per cent.—Method of determination and separation of stearic acid and oleic acid proceeding from saponification of tallow, by M. David. The principle of this process is based on the new fact that when into an alcoholic solution of oleic acid one pours acetic acid drop by drop, a moment comes when, suddenly, the oleic acid separates completely.—On the structure of nerves in invertebrates, by M. Cadiat. In crustacea, insects, and annelids, the nerves have no myelene, which in vertebrates is found between the cylinder axis and the wall proper of the tube (the grey fibres of the great sympathetic excepted). In gasteropodous and acephalous molluscs the sheath of Schwann is almost always wanting.—On the relations between the volume of motor or sensitive cells of nervous centres, and the length of passage of the impressions transmitted, by M. Pierret. The dimensions of the nerve-cells are in direct ratio of the distances which the motor incitations proceeding from them, or the sensitive excitations reaching them, have to traverse.—There were several other papers on chemical subjects, determination of arsenic in volumes, reciprocal combinations of metallic sesquisulphates, some combinations of platinum, nitrogenised acids derived from acetones, cyanide of ethylene, researches on peptones, &c.

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ERRATA.—In Mr. Broun's article on Cosmic Meteorology, vol. xviii. p. 152, 1st column, line 7, for 464, read 8,464; and p. 153, 2nd column, line 16, for "relate to magnetical and meteorological phenomena," read "relate magnetical to meteorological phenomena."